

## REMARKS

Applicant notes that this response is being filed in response to the Advisory Action of March 1, 2010, and is the second after final response filed in response to the final office action of December 8, 2009. The first response was submitted on February 9, 2010.

In a telephone message on February 17, 2010, Examiner Heincer noted that three references discussed in the response of February 9, 2010, did not accompany the response, and requested that they be submitted. Applicant submitted the three references *via* email, to Examiner Heincer on February 17, 2010. When the Advisory Action of March 1, 2010, was issued, and noted that the references had not been submitted, a phone call to Examiner Heincer revealed that the email containing the references had been caught by a USPTO spam filter and were not delivered to Examiner Heincer's inbox. Examiner Heincer requested in a telephone call on March 8, 2010, that the Applicant file this second after-final response, including the missing references. Examiner Heincer noted that this response would be timely considered.

### *Response to Advisory Action Comments*

Before reiterating the Applicant's remarks as provided on February 9, 2010, Applicant addresses two issues raised by the Examiner in the Advisory Action of March 1, 2010.

First, in the Advisory Action Examiner Heincer noted that if the documents fully referred to, and referenced, below (Müller, Hübner, and the Sartomer Technical data sheet) supported the arguments in the first after-final response of February 9, 2010, this rejection would be overcome. *See* Advisory Action, paragraph A). Accordingly, below and with this response, Applicant re-submits the Müller, Hübner, and the Sartomer Technical data sheet references, and the remarks regarding these references.

Second, with respect to the hindsight reconstruction comments by the Examiner in paragraph C) of the Advisory Action, Applicant is fully cognizant that any obviousness rejection is necessarily based upon a combination of known references. However, in the instant situation, the hindsight reconstruction, as fully described below, is based upon picking a piece of a molecule from one reference (Billington) and combining it with a piece of a different molecule from a different

reference (Jaeger/Jäger) without a synthetic rationale as to how those pieces could actually be combined. This goes directly to the Müller, Hübner, and the Sartomer Technical data sheet references which show that, synthetically, one of skill in the art would not expect that the combination of the starting materials having those separate pieces, would form the instantly claimed compounds. Applicant submits that without such a synthetic rationale to combine the pieces, there can be no teaching or suggestion of the presently claimed invention, and any suggestion to the contrary by the Examiner, must grounded upon impermissible hindsight reconstruction.

Finally, the remaining text of this response is as submitted in the first after final response of February 9, 2010.

By the present communication no claims are amended, canceled, or added. As such, claims 1, 3-13, and 19-29 remain pending in the application, with claims 19-28 withdrawn from consideration.

Applicant respectfully requests reconsideration of the present application in view of the following remarks.

*Written Description*

Claim 13 stands rejected under 35 U.S.C. §112, second paragraph, as failing to comply with the written description requirement. The examiner asserts that the “original specification contains no support for the use of an oligoamine to produce the carbon backbone.” *See* Office Action, page 2. Applicant respectfully traverses this rejection.

Applicant asserts that the specification as originally filed does provide ample support for the recitation of an oligoamine in claim 13. The Examiner’s attention is directed to the original specification at paragraphs 18 and 21, which are reproduced below, in relevant part:

[0018] ...The organically polymerizable group(s) of the residue {B} can essentially be chosen in any way. In this connection, they are preferably vinyl, allyl, norbornene, glycidyl, acrylate or methacrylate groups, thioacrylate or thiomethacrylate groups or groups derived from other (meth)acrylic acid derivatives, such as from the acid amides... Particularly preferably, {B} is derived from a substituted or unsubstituted compound with acrylate or methacrylate groups or the thio analogs of these or the acid

amides thereof...Two, optionally even still more, different groups, e.g. an acrylate or one or two methacrylate groups or vice versa, can also be present in {B}. {B} can exhibit a continuous carbon backbone; however, the carbon chain(s) (main and/or side chain(s)) can also be interrupted by heteroatoms or groups, such as O, S, SO, NH, NHCO, PR, POR, CONHCO, COO, NHCOO or the like...In addition, the groups or structures can be substituted in any way, e.g. with acid, acid amide, ester or amino groups...

[0021] ...The acrylate and/or methacrylate groups can be esterified with a relatively short-chain oligoalcohol (in particular an oligoalcohol comprising three to ten carbon atoms), e.g. a di- or tri- or tetra- or pentaalcohol, such as glycol, glycerol, trimethylolpropane or pentaerythritol or the like, the alcohol preferably being bonded via another of its alcohol functional groups to the C(O)X group. **Instead of the alcohol functional groups, it is also possible in suitable cases for thio or amine functional groups to be present;** optionally also mixed with alcohol functional groups. Then either the coupling group CO(X) can be an acid amide group or thioester group and/or the above-mentioned groups comprising a double bond can be bonded via amine or thio functional groups. In these cases, {B} comprises, e.g., thio(meth)acrylate or (meth)acrylamide groups. {B} can comprise the oligo(meth)acrylic esters, oligo(meth)acrylamides or oligo(meth)acrylic thioesters outlined above or, however, also consist thereof. In this group, the oligo(meth)acrylic esters are preferred.

(Emphasis added.)

As noted paragraph 18, the carbon backbone may be interrupted by heteroatoms or groups such NH, or the groups can be substituted in any way, for example, as amino groups. Furthermore, paragraph 21 states that the OH groups of the oligoalcohol may be amine functional groups.

Applicant submit, therefore, that the specification provides the requisite written description for the recitation of the oligoamine in claim 13. Applicant respectfully requests that the Examiner withdraw this rejection and allow the application to proceed to issuance.

*Jaeger, Billington, Omura*

Claims 1, 3-10, 13, and 29 stand rejected under 35 U.S.C. § 103(a) over U.S. Pat. No. 3,351,617, issued to Jaeger *et al.*, in view of U.S. Pat. No. 4,515,342, issued to Billington *et al.*, as evidenced by U.S. Pat. No. 4,612,384 to Omura *et al.* In this regard, Applicants note that “Jaeger”

is an alternate English spelling of “Jäger” and that the lead inventor named on the previously cited Jäger patent, No. 4,066,597, appears to be the same as that of the Jaeger reference.

Applicant respectfully traverses this rejection. The Examiner has cited to Jaeger, as opposed to Jäger as previously cited, in combination with Billington and Omura. Applicant also notes that the previous remarks with respect to Jäger were found persuasive, as Jäger was withdrawn as a reference, and the new Jaeger reference was cited. The Jaeger reference is closely related to Jäger, however, in teaching compounds with a slightly varied substitution and use, but with substantially the same structural backbone. Thus, Applicant’s previous remarks with respect to Jäger are relevant to Jaeger.

Because Jaeger teaches similar compounds as Jäger, Applicant asserts that Jaeger, also fails to provide any teaching or suggestion a phosphonate compound having more than one C=C moiety. The Examiner acknowledges this fact, stating that Jaeger “does not teach a polyfunctional ethylenically unsaturated reactant.” Yet, the Examiner continues to point to Billington and Omura as providing the missing information in Jaeger.

Applicant stands behind the remarks of record with respect to Jaeger/Jäger, Billington, and Omura. Those arguments may be summarized as:

1. Jaeger and Jäger both teach phosphonate compounds where there is a single C=C moiety, as opposed to the presently claimed compounds that require more than one organically polymerizable group that contains a C=C moiety;
2. Billington and Omura both are directed to phosphate compounds  $[(RO)_2P(O)OR']$  as opposed to the presently claimed phosphonates  $[(RO)_2P(O)R'']$ ; and
3. There is no teaching or suggestion in Jaeger, Billington, or Omura of the use of more than a single C=C moiety in the {B} moiety of the claimed compounds of formula  $[(R^1)(R^2)P(O)-(CHR^3)-(CHR^4)-(CHR^5)_m-C(O)X-]_n\{B\}$ .

In addition to these arguments, Applicant also asserts that the modifications proposed by the Examiner, are not feasible reactions, according to the person of ordinary skill in the art as evidenced by the attached materials by Müller *et al.* reference (*Aus den Laboratorien der Farbenfabriken Bayer, AG Leverkusen* pages 27-51, June 25, 1962); Hübner *et al.* (*Die Angewandte Makromolekulare Chemie* 11 (1970) 125 – 134); and the Technical data sheet “SR444D” from Sartomer.

In the rejections, the Examiner agrees with Applicant’s summary of Jaeger, in that the reference does not teach a polyfunctional ethylenically unsaturated reactant. To fill this void, the Examiner points to Billington as teaching the reaction of a polyhydric alcohol with at least four hydroxyl groups, such as pentaerythritol, with at least three of the hydroxyl groups esterified with an acrylate and a phosphorous containing compound. The Examiner asserts that it would have been obvious to have used the polyfunctional polyol of Billington in the preparation of the compounds of Jaeger, and the motivation to do so would have been to improve the adhesion of the resultant polymer to the substrate. *See Office Action*, page 3.

However, Applicant submits that the Examiner’s modification is not likely to work, and there can be no expectation of success in such a modification. The Examiner’s modification is to modify the compounds of Jaeger with the pentaerythritol triacrylate of Billington. Applicant submits that such modifications ignore a number of factual properties and chemical reaction schemes of the compounds involved.

First, in examples 1 and 4 of Jäger II, the preparation of methylene-N-methylacrylamide-N’-β-[dimethylphosphono]-propionamide is described as taking place in an *aqueous solution*. However, as evidenced by the attached Technical data sheet from Sartomer, pentaerythritol triacrylate is *insoluble* in water. On page 4, item 9 the technical data sheet describes pentaerythritol triacrylate as “Beschreibung der Löslichkeit: In Wasser nicht löslich.” Translated into English, this means “description of solubility: not soluble in water.” Thus, there is a substantial solubility reaction barrier to the Examiner’s proposed combination.

Second, it is expected that where a carbonic acid amide is brought in contact with an alcohol, either no reaction would take place, or if the reaction is driven forward, the expected product would be a carbonic ester prepared *via* transesterification. Thus, where pentaerythritol triacrylate is brought into contact with  $\beta$ -(dimethylphosphono)propionamide, it would be expected that no reaction would occur, or an ester would be formed. In contrast, the reactions of Jaeger proceed because of the specific functionalities present in the reactants, functionalities that are absent in the putative modifications of the Examiner.

The preparation of the phosphonates of Jaeger is possible because of the presence of the  $\text{-NHCH}_2\text{OH}$  group in N-methylolacrylamide. This reaction is specific to N-methylolacrylamide and is not amenable to using other compounds, such as the pentaerythritol triacrylate from Billington, which lacks such a functional group.

As explained by the attached Müller reference, N-methylolacrylamide may be polymerized into homo- or co-polymers. This is explained in the first full paragraph on page 27. The next paragraph, bridging pages 27 and 28, indicates that such polymers are stable in an alkaline environment, but under neutral and acid conditions, the alcohol moiety of the molecule undergoes a self-condensation reaction, with expulsion of water and a  $\text{-CH}_2\text{O-}$  group. See the first reaction scheme on page 28. Müller clearly shows that it is specifically the methylol group which easily undergoes the self-condensation reaction where it is located next to a NH group. The ease of such a condensation reaction, *via* the elimination of water, explains the reactions as disclosed by Jaeger, which proceed *via* the same mechanism. Because this reaction is specific to N-methylolacrylamide, replacement with pentaerythritol triacrylate which lacks a  $\text{-NHCH}_2\text{OH}$  group, would likely not result in a comparable reaction. Instead the expected result from a reaction between pentaerythritol triacrylate and the  $\beta$ -(dimethylphosphono)propionamide is either no reaction, or a transesterification reaction.

Other representative condensation reactions of N-methylolacrylamide, under acid catalysis, are illustrated by the attached Hübner reference, on page 126, scheme 1 and page 128, scheme 3. Scheme 1 is a condensation reaction of N-methylolmethacrylamide groups of the respective copolymers. Scheme 3 indicates the reaction of a  $\text{-NHCH}_2\text{OH}$  group, in general. Such condensation

reactions result in the same kind of product as shown in Jaeger, and as illustrated, it is a methylol group that is required. Such condensation reactions would not occur with pentaerythritol, contrary to the Examiner's suggestion, because pentaerythritol does not include a  $\text{-NHCH}_2\text{OH}$  group.

In summary, if the skilled person would try to combine the pentaerythritol triacrylate of Billington with  $\beta$ -[dimethylphosphono]-propionamide, as suggested by the Examiner, under the aqueous, acid conditions of examples 1 and 4 of Jaeger, the person of ordinary skill in the art would expect that:

- (a) The pentaerythritol triacrylate would not dissolve in the mixture and therefore would be expected remain unreacted;
- (b) Even if the pentaerythritol triacrylate were to be brought into the aqueous solution, it would remain unreacted, due to the equilibrium of the reaction being in the favor of the reactants and not products; and
- (c) Even if the reaction were driven to completion, a secondary carbonamide would be produced and not the presently claimed compounds.

Thus, the allegations of the combination of Jaeger with Billington, as put forth by the Examiner are not grounded upon chemical reactions that would be understood by those of skill in the art to result in the presently claimed compounds. In other words, the person of ordinary skill in the art would not have any expectation of success in producing the claimed compounds, based upon the references cited by the Examiner.

Such an understanding is further evidence of the Applicant's previous assertions that the Examiner's rejections can only be supported by impermissible hindsight reconstruction of the individual parts of the claimed compounds. See Applicant's response of November 21, 2008. In that response, the Applicants showed that the Examiner has been guided by the Applicants' own teachings to choose particular groups from each reference, to thereby arrive at the presently claimed invention, for as shown above, the Examiner's proposed reactions and combinations would not be predicted to result in the claimed compounds. That this approach is improper is apparent from the

PTO's own rules. For instance, § 2141.01(III) of the MPEP notes that the "content of the prior art is determined at the time the invention was made to avoid hindsight," and §707.07(f) states that

...any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, *and does not include knowledge gleaned only from the applicant's disclosure*, such a reconstruction is proper.

(Emphasis added.) Similarly, the "tendency to resort to 'hindsight' based upon Applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, *impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.*" MPEP § 2142 (emphasis added).

The PTO's review court likewise has mandated that "a prima facie case of obviousness for a chemical compound...begins with the reasoned identification of a lead compound." *Eisai Co. Ltd. v. Dr. Reddy's Laboratories Ltd.*, 533 F.3d 1353,1359 (Fed. Cir. 2008) (copy appended). From this perspective, substantiating a finding of obviousness can be based on structural similarity along with some "motivation that would have led one of ordinary skill in the art to select and then modify a known compound (i.e. a lead compound) in a particular way to achieve the claimed compound." *Id.* at 1357.

Section 2143.01 (III) of the MPEP explains that "the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." This is wholly consistent with the position taken by the Federal Circuit in *Eisai*. The prior art must form the basis for the reasons to modify a particular compound, and the prior art must provide reason to one of skill in the art to select a particular compound for modification.

In the present application, the Examiner has identified the compounds of Jaeger as the lead compounds for modification. However, as shown, if the person of ordinary skill in the art were to make the Examiner's proposed modifications, that person would encounter significant solubility issues, lack of reaction, and potential products other than the presently claimed compounds.



Therefore, because the rejection can only be based upon hindsight reconstruction, without an appreciation of the reaction chemistry required to effect the chemical transformations, a case of obviousness has not been supported and Applicants request that the Examiner withdraw the pending rejection and allow the application to move forward to issuance.

Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jaeger; in view of Billington as evidenced by Omura; and further in view of Omura. Applicant respectfully traverses this rejection.

As stated above, Applicant stands by the remarks of record in traversing the rejection based upon Jaeger/Jäger, Billington, and Omura. For Jaeger teaches substantially the same compounds as Jäger, with the primary difference related to some substitution of the compounds and their use, and thus the Applicants previous remarks with respect to Jäger are likewise valid with respect to Jaeger. As evidenced by the above remarks, the combination of Billington and Jaeger will not result in the presently claimed compounds with any expectation of success. Furthermore, Omura does nothing to cure this deficiency.

Omura is directed to *phosphate* compounds, *not* *phosphonates*. The Examiner ignores this fact when asserting that "Omura et al. teaches that amide and ester functional acrylic compounds can be produced by the same basic procedure (25:36-65)." For this passage cited by the Examiner deals entirely with compounds other than phosphonates that are the subject of the presently claimed invention. There is no teaching or suggestion in this passage that is generally applicable to phosphonates. Omura fails to cure the deficiencies of Jaeger and Billington with respect to the formation of the backbone of the compounds, and Applicant respectfully requests that the Examiner withdraw the noted rejection and allow the application to move forward to issuance.

As illustrated above, Applicant asserts that the person of ordinary skill in the art would have no expectation of success in practicing the Examiner's putative modification of Jaeger with Billington, and Omura fails to fill the deficiencies. In view of the foregoing, Applicant submits that the grounds for each of the remaining rejections have been overcome. Applicant respectfully

requests that the Examiner withdraw the noted rejections and allow the application to proceed to issuance.

### **Request for Rejoinder of Claims**

In the non-final office action of May 19, 2009, the Examiner stated that because the withdrawn claims are directed towards a method of making the elected compounds, rejoinder would be proper at the time the compound is found patentable. As shown above, the claimed compounds are free of the cited art, and so Applicant requests rejoinder of the withdrawn claims and the movement of all claims to issuance.

Favorable reconsideration is requested, therefore. Examiner Heincer is invited to contact the undersigned directly, should he feel that any issue warrants further consideration.

Respectfully submitted,

Date March 8, 2010

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